1. Introduction

Familial Hypercholesterolemia (FH) is an hereditary disease from a genetic alteration, which causes an increase in cholesterol levels, specifically LDL Cholesterol (LDL-C)\(^1\). This is considered as a risk factor for the premature development of cardiovascular disease (CVD)\(^1,2\). It is an autosomal dominant disease, which their genotype may be heterozygous or, more rarely, homozygous, with the latter more severe phenotype and Total Cholesterol (TC) levels higher than in the heterozygous form\(^1,2\).

Our main goal is to demonstrate the relationship between bioactive compounds (in particularly, polyphenols) and the expression of some genes that are “altered” in the individual with FH.

2. Familial Hypercholesterolemia

The FH is considered a "silent disease" since usually has no symptoms\(^3\).

3. Genetics of FH

<table>
<thead>
<tr>
<th>Gene</th>
<th>Chromosome</th>
<th>Encodes</th>
<th>Mutations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDLR</td>
<td>19p13.1-p13.3</td>
<td>LDL receptor - cell surface glycoprotein (LDLR)</td>
<td>Class 1, Class 2, Class 3, Class 4, Class 5</td>
</tr>
<tr>
<td>ApoB</td>
<td>2p23-2p24</td>
<td>ApoB100 protein (LDL binds to its receptor through apoB100)</td>
<td>p.R3527Q (frequent in Europe)</td>
</tr>
<tr>
<td>PCSK9</td>
<td>1p32-p34</td>
<td>Serine protease (decreased LDLR in hepatocytes)</td>
<td>Increased activity (increased levels of c-LDL)</td>
</tr>
</tbody>
</table>

4. Nutrigenomics and FH

**Dietary Polyphenols**

- Procyanidin B2
- Procyanidin C3
- Cinnamatin A2
- Rosmarin, Catechin, Ercidin, Genetin, Gallic acid, Tangeretin, Taxifolin

**Target Protein**

- APOA-I, APOB, APOB100
- LDLR

**Molecular Signature**

- Increase expression and secretion
- Increase expression

5. Nutritional and pharmacological care of FH

- Individuals suffering from FH should adopt a healthier lifestyle combined with a balanced diet\(^2\):
  - Rich in plant foods, fruits, whole grains and fiber, (preferably soluble since it helps to decrease the concentrations of TC and c-LDL)
  - Low in saturated and trans fat, preferring the unsaturated (mono and polyunsaturated), in particular the olive oil, to reduce the c-LDL from the diet\(^5\)
- Drug therapy is almost inevitable, and is a therapy that involves the medication with statins, fibrates, nicotinic acid and cholesteramine\(^1,2\).

6. References